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### Vu Villa Staircase Structural Repair

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**Montana**Tech

## Vu Villa Staircase Structural Repair

### Team Members:

**Kevin Bingham, Tyler Lindbloom,  
Kaden Sukut, Tanner Laws, Cody  
Baszler, Alec Steele, Eli Brewer, Derek**

**Advisor: Kolby Sukut**



### Background

The Vu Villa in uptown Butte has a staircase leading to the second floor that are beginning to sag and need structural support to fix the sag in the stairs.

### Option 1— Beam

Using the LRFD method of wood design, the loading conditions were determined. Using the ultimate load, the beam size was determined, being a **3 1/2" x 11 7/8" 24F-V4 DF/ DF Glulam Beam**. The connections needed were designed using Simpson Strong-Tie connections. The connections being used are **MBHU 3.56/11.88KT** and **CCQ74SDS2.5**.



### Beam Construction:

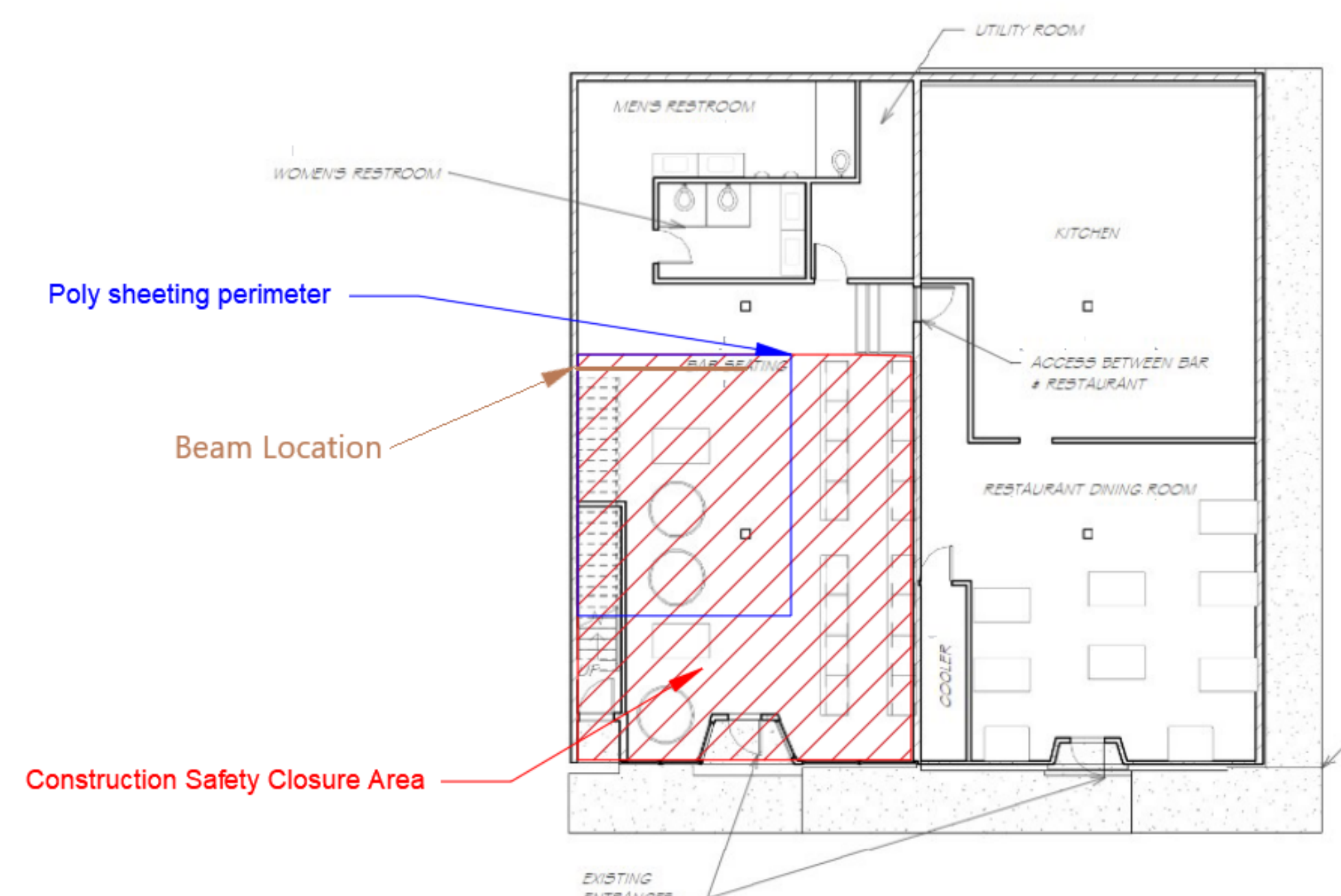
Material & Supplies = \$432

Labor = \$2,317

(18.75 hrs over two days)

Equipment = \$4,741

Total Cost = \$7,490



### Positive Aspects of Option 1:

Less invasive

Lower bid cost

Shorter construction duration

### Option 2– Wall

- . 2x6 Hem-Fir Used for Studs, Top Plate, Kickers, and Bottom Plate
- . 16 " O.C. stud spacing
- . 16' Height, 32'1" Length
- . Use 10d nails
- . All connection will be toe-nailed
- . Wall connects to Staircase Stringer

### Wall Construction:

Material & Supplies = \$3306.50

Labor = \$6,168.14

(8 DAYS)

Equipment = \$1,117.95

Total Cost = \$13,876.16

### Positive Aspects of Option 2:

Creates New Storage Area

Improves Visual Appearance

Maximizes Floor Space Use

